Amino Acids, Dipeptides, Tripeptides and Proteins

**1)** Peptides are formed when amino acids combine.

(i) show two possible dipeptides that can be formed by combining the amino acids:

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(ii) Circle the amide link in each dipeptide.

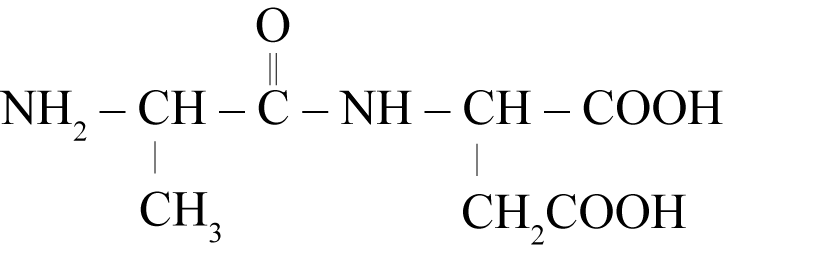
**2) a)** Glycine and serine are two amino acids, which can combine to form dipeptides.

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| **Chemistry 3**  **glycine** | Chemistry 3  **serine** |

**i)** Draw the structure(s) of the possible dipeptide(s) formed from a combination of glycine and serine.

**ii)** Explain your answer in terms of the structure and functional groups present in the amino acids and in the dipeptide(s).

**b)** Determine the products of hydrolysis of the molecule shown below in BOTH acidic and basic conditions. Justify your answer in terms of structure and reactivity.

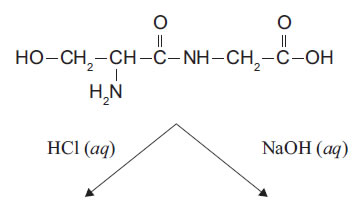


**3)** Amino acids are the building blocks that make up proteins. Alanine and valine are amino acids which can combine to form dipeptides.

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**a)** Draw the structure of a possible dipeptide formed from the combination of alanine and valine.

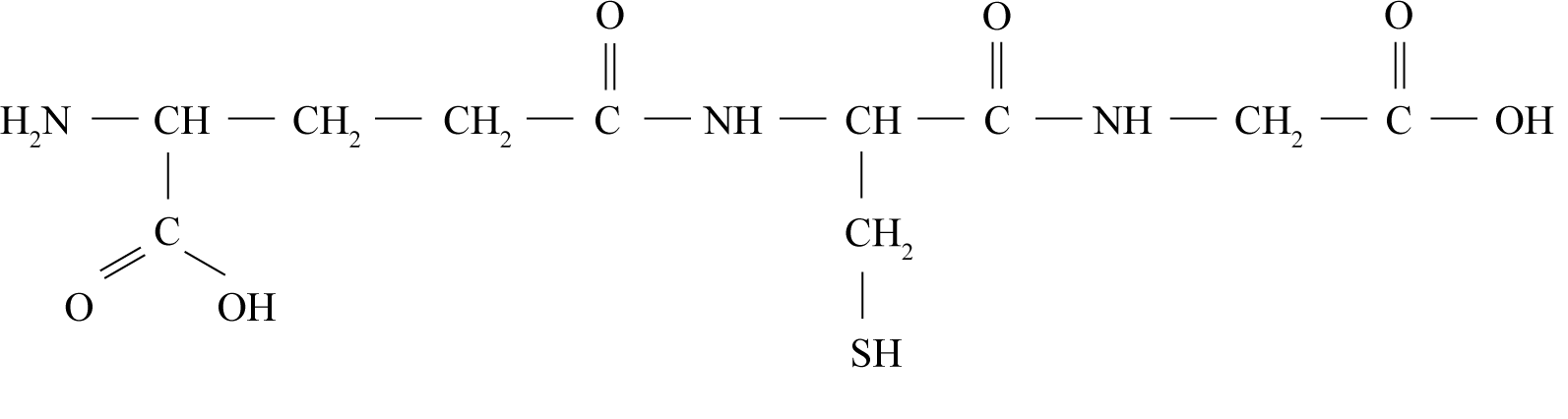
**b)** Draw the organic products of the hydrolysis of the dipeptide below using :



**i)** dilute hydrochloric acid solution

**ii)** dilute sodium hydroxide solution.

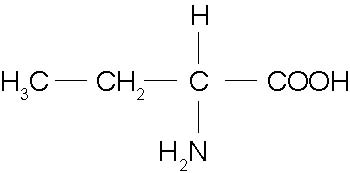
**4) a)** Gluthathione (GSH) is one of the most common small peptides in animals, plants and bacteria.

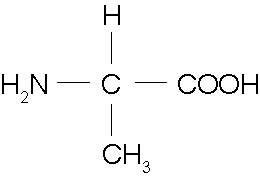
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**i)** Draw a circle around one of the amide (peptide) groups.

**ii)** Draw structures of the products of the hydrolysis of this compound using alkaline conditions (NaOH)

**and** compare with the structures of the hydrolysis products under acidic conditions.

**5)** Compound  undergoes a condensation reaction with the following

molecule  (commonly referred to as alanine). It forms two different organic products

referred to as dipeptides.

**i)** Draw the structural formulae for the two possible dipeptides.

**ii)** Explain why the formation of dipeptides is referred to as a ‘**condensation reaction**’.

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